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and Arterial Murmurs in the Neck,
Based on Examinations of Fifteen
Hundred Persons.*

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FROM

THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES,
FEBRUARY, 1893.

THE DIAGNOSTIC SIGNIFICANCE OF THE VENOUS AND
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THE occurrence of certain auscultatory phenomena in the great vessels of the neck has been familiar to the profession since the days of Laennec, more than seventy years ago. Their presence has generally been attributed to those pathological changes in the blood constituting the condition known as anæmia, but their exact diagnostic relations have never seemed to reach any fixed or settled status in practical medicine. The following quotations from text-books and contributions to medical periodicals published within the last fifteen years will show the diversity of opinion regarding the clinical value of these sounds, referring more particularly to the venous hum :

A. Weil² expresses the opinion that "neither the presence of the venous hum in itself, nor its intensity, its rhythm, nor its persistence in various positions of the head or neck, stands in connection with any particular form of disease."

Immermann³ writes as follows: "Two symptoms often met with in anæmic patients are worthy of special notice because of their importance in relation to diagnosis. They are supposed, not altogether unjustly, to furnish valuable evidence of the presence of anæmia. I refer to the so-called 'anæmic murmurs' over the region of the heart, and the *bruit de diable* heard in the veins of the neck."

Gerhardt⁴ believes that "when the venous hum is not produced by some accidental influence, it is apt to be due to anæmia." He thinks those cases in which a thrill is appreciated by the finger are significant of anæmia and of diagnostic importance.

Guttmann⁵ states "that the typical venous hum is found only in anæmia."

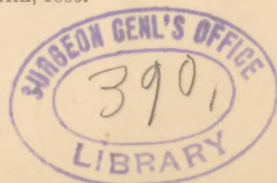
¹ Read before the New York Academy of Medicine, June 21, 1892.

² Auscultation of the Arteries and Veins. Leipzig, 1875.

³ Art. "Anæmia," Ziemssen's Cyclopædia. New York, 1877.

⁴ Lehrbuch der Auscultation und Percussion. Tübingen, 1884.

⁵ Lehrbuch der klinischen Untersuchung-Methode. Berlin, 1886.



Fagge¹ makes the following statement: "It is important to notice that none of these murmurs (arterial and venous) are of the slightest significance from a clinical point of view, so far as the diagnosis of anæmia itself is concerned."

Flint² writes thus: "Of special significance in the diagnosis of anæmia is the presence of certain physical signs. . . . The arterial murmur is present in only a certain proportion of cases, but the venous hum may be heard almost invariably."

Eichhorst³ does not attach much significance to the venous hum, as shown by the following remark: "The *bruit de diable* is often heard over the bulb of the internal jugular vein (in anæmia), but this sound is also often heard in healthy individuals."

Strümpell⁴ concludes as follows: "Murmurs in the large veins of the neck are very often heard in anæmia, either with or without cardiac murmurs. . . . We believe that the loud venous murmurs are more frequent in the anæmic than in other persons. We cannot claim, however, that they are of any great diagnostic value."

Apetz⁵ claims that among six hundred and sixty patients examined by him in hospital wards, two hundred and eighty-four (forty-three per cent.) presented venous murmurs. Dividing his cases into three classes, anæmic, slightly anæmic, and non-anæmic, he claims to have discovered fifty-one per cent. of murmurs in anæmic persons, forty-six per cent. in slightly anæmic, and thirty-nine per cent. in those not at all anæmic. Apetz, therefore, concludes that "as this phenomenon is so often heard in persons who are not anæmic, it possesses very little diagnostic value, and should hardly be counted in favor of, or against, the presence of this affection."

Loomis⁶ expresses himself thus: "The constant and important signs of anæmia are hæmic murmurs, which may be cardiac, arterial, or venous."

Dr. Bewley,⁷ in a paper presented to the Royal College of Physicians of Ireland, March 6, 1891, arrives at the following conclusion: More than half the young persons who are *not* anæmic have a murmur in the neck. The presence of a hum, therefore, is of no diagnostic significance in any individual case."

Vierordt⁸ says: This murmur (the venous hum) is sometimes heard

¹ The Principles and Practice of Medicine. London, 1886.

² The Principles and Practice of Medicine. Philadelphia, 1886.

³ A Handbook of Practical Medicine, 1886.

⁴ A Text-book of Medicine, 1887.

⁵ Virchow's Archiv, cvii.

⁶ A Text-book of Practical Medicine, 1889.

⁷ Lancet, vol. i., 1891.

⁸ A Text-book of Clinical Diagnosis. Leipzig, 1891.

in many healthy persons. . . . Strictly speaking, no diagnostic importance is to be attached to the phenomenon."

It will thus be seen that the testimony in reference to the meaning of these vascular sounds, as shown by the foregoing statements and opinions of recognized authorities, is very confusing, and in some instances absolutely contradictory. In view of this unsatisfactory state of contemporaneous evidence, the author determined, about a year since, to make a personal investigation of the subject, and ascertain, so far as examinations of a large number of persons would show, what relations these phenomena bear to diseased conditions, and what value to place upon them as a means of diagnosis. The investigation was begun early in June, 1891, and was terminated early in March, 1892. During that period fifteen hundred persons of various ages and conditions were examined. With reference to the diseases from which these persons were suffering, they may be classified as follows:

	Cases.
Bronchitis, with various complications of asthma, emphysema, influenza, malaria, etc.	611
Dyspepsia and intestinal disorders	177
Phthisis pulmonalis	122
Diseases of the heart, functional and organic	95
Anæmia and chlorosis	31
Muscular rheumatism, lumbago, etc.	41
Renal affections, acute and chronic	17
Articular rheumatism, acute and chronic	14
Various unclassified complaints, headache, nervousness, insomnia, pregnancy, pneumonia, etc.	349
Normal cases, persons presenting no appreciable pathological condition	43
Total	1500

The great preponderance of thoracic diseases is explained by the fact that a majority of the cases were seen at the Chest clinic of the Bellevue Hospital, Out-door Department, and at the clinic for General Medicine of the New York Post-Graduate Medical School and Hospital. It should be stated here that all of these patients were under my own treatment or observation. Many of them were kept under treatment for a long period of time, and not a few were examined by successive classes at the Post-Graduate School. The instrument employed in examining the neck was an ordinary flexible Cammann's binaural stethoscope. The patients were almost invariably examined in sitting or standing posture, with the head and neck in an easy and unconstrained position; a small number only being auscultated while recumbent.

The examinations of these fifteen hundred persons, as shown in the table on the opposite page, resulted in the discovery of fifty-one cases of well-marked and unmistakable hæmic bruits or murmurs originating in the bloodvessels, which equal 3.4 per cent. of the whole number.

These figures do not include those accidental murmurs induced by improper pressure of the stethoscope, or twisting of the neck unduly, nor do they include those cases of inspiratory breathing-sounds, which in some persons so nearly simulate the *bruit de diable*. In every case of doubt the patient was instructed to temporarily suspend respiration. A study of the statistics comprised in the table will reveal the following important, and, it seems to the author, conclusive facts: Of the fifty-one cases presenting hæmic bruits, we find that forty-three were females, in a total of six hundred and eighteen females examined—slightly under seven (6.95) per cent. There were eight males who presented bruits out of a total of eight hundred and eighty-two males examined—a little less than 1 per cent. This would indicate that these vascular phenomena are about seven times as common in females as in males. Analyzing the cases with reference to the age of greatest frequency, we obtain the results, by decennial periods, exhibited on the opposite page.

These numerical data indicate that these murmurs occur with far greater frequency during early adult life than at any other period of existence. Taking the period from fifteen to twenty-five years inclusive, we find that 39 of the 51 cases of the vascular bruits occurred during this time (more than 76 per cent. of the entire number). The youngest person presenting a bruit was a girl, aged thirteen years, with chlorosis, and the oldest was a man, aged forty-eight years, suffering from empyæma. The average age of the 51 persons with cervical murmurs was a little over twenty-three years.

A most important point for analysis relates to the diseases of those persons in whom the vascular murmurs were discovered. A study of the subject resulted as follows: Of 31 well-marked cases of anæmia and chlorosis, we find 28, or more than 90 per cent., presented hæmic bruits. The next disease in order of frequency of vascular sounds is phthisis (in which affection we know anæmia to play an important part). Of 122 cases, we find that in 8 vascular murmurs were present. Among the remaining 1349 persons examined, we find only 15 in whom a true hæmic bruit could be elicited. Several of these are marked "anæmic" as complications of some other affection, and, while the author has no numerical data bearing on this point, a majority of them might properly have been indorsed in the same way. We notice, further in the table, that in almost all of the cases of vascular bruit marked "loud" or "distinct," anæmia or chlorosis is given as the disease condition present. Of 43 healthy persons examined, only 1 exhibited a vascular murmur; in this case there was a rough carotid murmur heard on the right side only.

TABLE OF CASES PRESENTING CERVICAL MURMURS.

No.	Sex.	Age.	Disease.	Vascular sounds.
1	M.	20	Dyspepsia, cardiac palpitation	Slight venous hum right side.
2	F.	18	Chlorosis	Distinct venous hum right side.
3	M.	22	Phthisis	Faint venous hum right side.
4	M.	28	Phthisis	Distinct hum right side.
5	F.	13	Chlorotic anæmia	Slight hum right side.
6	F.	28	Dyspepsia; quite anæmic	Loud hum right, and carotid murmur both sides.
7	F.	18	Chlorosis	Loud venous hum left side.
8	F.	24	Chlorosis	Loud venous hum right side.
9	F.	23	Mitral regurgitation; chlorosis	Loud hum over right external jugular vein, arterial murmurs both sides.
10	F.	16	Bronchitis; anæmic	Slight carotid murmur left side.
11	F.	27	Phthisis	Faint venous hum (side not noted).
12	F.	38	Metrorrhagia	Venous hum right side.
13	F.	40	Menorrhagia	Slight venous hum and arterial murmurs (location not noted).
14	F.	21	Peritonitis; very anæmic	Venous hum right, and arterial murmurs both sides.
15	M.	23	Normal; no disease	Rough carotid murmur right side.
16	M.	31	Phthisis; somewhat anæmic	Slight venous and arterial murmurs both sides.
17	M.	32	Ingrowing nail	Slight venous hum (location not noted).
18	F.	24	Peritonitis	Venous hum right side.
19	F.	24	Anæmia	Faint arterial murmur right side.
20	F.	17	Debility	Slight venous hum both sides.
21	F.	25	Phthisis; very anæmic	Venous hum and arterial murmurs right side.
22	F.	17	Phthisis	Slight venous hum both sides.
23	M.	48	Empyæma	Developed venous hum and arterial murmurs while under observation.
24	F.	27	Malarial fever	Venous hum right side.
25	F.	18	Chlorosis	Venous hum and arterial bruit right side.
26	F.	21	Chlorosis	Faint carotid murmurs (side not noted).
27	F.	17	Chlorosis	Faint venous hum right, carotid bruit left side.
28	F.	36	Probably aortic stenosis	Rough bruit over right carotid.
29	F.	14	Chlorosis	Carotid and venous (location not noted).
30	F.	20	Chlorosis	Venous hum right side.
31	F.	18	Chlorosis	Carotid and venous right, carotid left side.
32	F.	18	Exophthalmic goitre	Faint carotid bruit right side.
33	F.	30	Left subclavian aneurism	Bruit from aneurism.
34	F.	16	Chlorosis	Venous hum right and left sides.
35	F.	23	Chlorosis	Venous hum both sides.
36	F.	23	Phthisis	Faint arterial right side.
37	F.	25	Anæmia	Faint venous left, carotid right side.
38	F.	16	Chlorosis	Arterial murmur and venous hum right side.
39	M.	35	Nephritis; dyspepsia	Hum over right external jugular.
40	F.	16	Chlorosis	Distinct right and faint left venous hum.
41	F.	15	Chlorosis	Loud arterial and venous right, faint left side.
42	F.	18	Chlorosis	Venous hum right side.
43	F.	16	Bronchitis; constipation	Slight right carotid bruit.
44	F.	21	Chlorosis	Venous hum (location not noted).
45	F.	16	Chlorosis	Venous hum both sides.
46	F.	22	Chlorosis	Venous and carotid bruits both sides.
47	F.	22	Chlorosis	Right and left venous bruits.
48	F.	18	Chlorosis	Slight venous and arterial murmurs both sides.
49	F.	18	Chlorosis	Venous hum both sides.
50	F.	16	Bronchitis	Slight venous hum right side.
51	F.	16	Bronchitis; anorexia	Faint venous hum right side.

Years.		Per Cent.	
Under 10	26 persons examined,	no bruits	
From 10 to 20,	135	22	(16.29)
" 20 to 30,	476	21	(4.41)
" 30 to 40,	374	6	(0.016)
" 40 to 50,	239	2	(0.008)
" 50 to 60,	155	no	
" 60 to 70,	80	"	
" 70 to 80,	13	"	
" 80 to 90,	2	"	

A question of some interest relates to the points of origin and the location of these hæmic bruits. An analysis of the facts in the table bearing on this subject shows venous murmurs present in 42 cases, as follows :

	Cases.
On right side alone, in	21
On left " " "	2
On both sides, in	12
On side not noted, in	7

Venous murmurs present without arterial bruit in 26 cases. Arterial murmurs present in 25 cases :

	Cases.
On right side alone, in	9
On left " " "	3
On both sides, in	9
On side not noted, in	4

These data furnish some curious facts. They indicate that these cervical murmurs, both venous and arterial, are frequently present on one side of the neck alone, and far more frequently on the right than on the left side, the proportion being more than 10 : 1 for the venous and 3 : 1 for the arterial bruit. The figures show further that the *bruit de diable* is considerably more common than the arterial murmur, and, also, that each variety is frequently present in the same individual without the other. These facts were first noted by the author while engaged in the study of chlorosis in 1886, and were contained in an article on that disease contributed to the *New York Medical Journal* of June 11, 1887. Until the present analytical investigation they seem to have received no subsequent verification. With reference to the location of the greatest audibility of these cervical sounds the author may be allowed to quote from this contribution : " After numerous clinical investigations I would locate the maxim intensity of this bruit—*i. e.*, the venous hum—in a plane rather external to the course of the great vessels of the neck. The space will correspond very nearly to a triangle having a base about two inches in length formed by the upper border of the inner third of the clavicle, the sides intersecting at a point about two inches above that bone." After six years' further experience with these murmurs, the author would now add that this area might be extended inward so far as to include the space underlying the sternal tendon of the sternocleidomastoid muscle. In many cases the bruit can be heard only in the triangular depression (when this exists) between the two tendons of this muscle. In other cases it is best heard at the outer border of the supra-sternal notch. In some cases, when the hum is not at all appreciable over the internal jugular vein, it may be heard over the external jugular, near the outer edge of the above-described triangular area. When heard over the external jugular the murmurs may be caused to instantly

disappear by firm pressure with the stethoscope and arresting the flow of blood in the vessel. The *bruit de diable* is not absolutely continuous, but may rather be described as intermittent, being loudest during inspiration. This has been ascribed to an intra-thoracic suction-force which hastens the return-current of blood through the jugular veins during inspiration. Referring to the location of greatest distinctness of the systolic arterial bruit, we may again quote from the article above referred to. We there find it stated that "this area is located at the summit of the thorax in front, and the root of the neck over the carotid arteries." The author would modify this statement only by noticing the fact that these hæmic systolic bruits of anæmia seem to be transmitted not infrequently up the carotid artery of one side only, and much oftener up the right than up the left side.

CONCLUSIONS.—The important deductions from the foregoing statistical study of these vascular phenomena may be briefly summarized as follows:

1. Hæmic bruits are rarely heard in healthy persons.
2. They are not often heard in persons not showing a considerable degree of anæmia.
3. They are heard in 90 per cent. of persons showing a well-marked degree of anæmia.
4. They are, therefore, of great significance in the diagnosis of this condition.

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